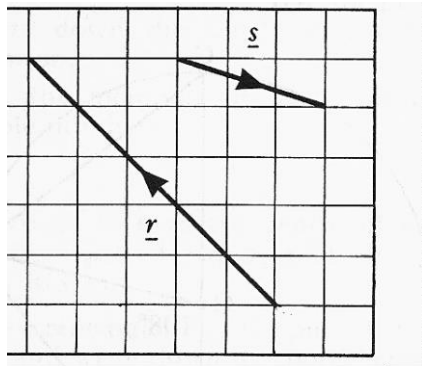


## National 5

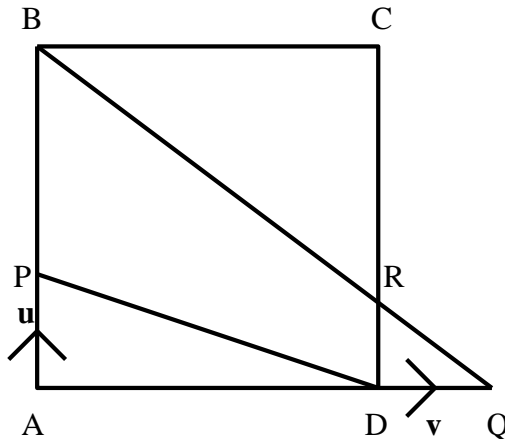
### Homework AP4

1. (a) The diagram below shows representatives of the vectors  $\mathbf{r}$  and  $\mathbf{s}$ .



Write down the components of

- (i) (1)  $\mathbf{r}$  (2)  $\mathbf{s}$  (3)  $\mathbf{r} + \mathbf{s}$
- (ii) Express  $|\mathbf{r}|$  as a surd in its simplest form.
2. In the diagram below ABCD is a square of side 3 units and P lies on AB such that  $BP = 2$  units and AD is produced to Q so that  $DQ = 1$  unit.  $\overrightarrow{AP}$  and  $\overrightarrow{DQ}$  are representatives of the vectors  $\mathbf{u}$  and  $\mathbf{v}$  respectively.



- (i) Express in terms of  $\mathbf{u}$  and/or  $\mathbf{v}$
- (1)  $\overrightarrow{AD}$  (2)  $\overrightarrow{PD}$  (3)  $\overrightarrow{BQ}$
- (ii) If BQ cuts CD at R and  $\overrightarrow{RD} = k\mathbf{u}$ , write down the value of  $k$ .
3. Solve each of these for  $0 \leq x \leq 360$ .
- (a)  $\sin x^\circ = 0.5$  (b)  $4 \tan x^\circ + 3 = 0$  (c)  $2 \cos x^\circ = \tan 47^\circ$

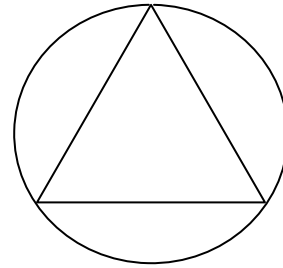
4. Sketch the graph of these functions for  $0 \leq x \leq 360$ .

(a)  $y = 10 \cos 2x^\circ$                       (b)  $y = 5 + 10 \cos 2x^\circ$ .

5. Change the subject of this formula to  $d$ :  $F = \frac{GMm}{d^2}$ .

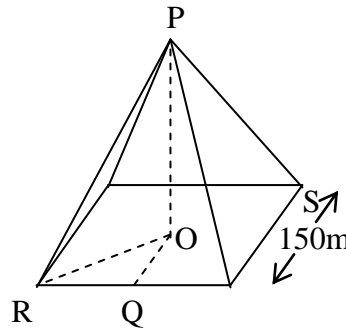
6. In triangle ABC,  $BC = 6$  metres,  $AC = 10$  metres and angle  $ABC = 30^\circ$ .  
Given that  $\sin 30^\circ = 0.5$ , show that  $\sin A = 0.3$  without using a calculator.

7. An equilateral triangle is inscribed in a circle.  
If the triangle has sides of length 10cm, find  
(a) the radius of the circle  
(b) the area of the triangle expressed as  
as a percentage of the area of the circle.



8. A square-based pyramid has edges of length 150cm.

- (a) If  $\angle OQP = 70^\circ$ , find the length of PQ.  
(b) By finding the length of PO and RS, find the size of  $\angle PRO$ .



9. When  $\pounds P$  is invested at  $r\%$  compound interest, the amount,  $\pounds A$ , after  $n$  years, is given by

$$A = p \left( 1 + \frac{r}{100} \right)^n.$$

Find  $A$  when  $\pounds 300$  is invested at  $8\%$  compound interest for 3 years.

10. The cross-section of the prism sketched below is a regular pentagon of side 12 cm.  
The length of the prism is 20cm.  
Calculate the volume of the prism.

